

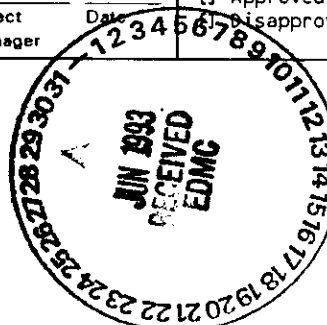
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7. Abstract

This description of work directs field activities for performing several aquifer tests at and near the 200 West Area in support of the 200-UP-1 Project. Tests will consist of slug tests, and single-well and possibly multiple-well constant discharge tests. Test results will be used to expand and refine the hydrogeologic conceptual model of the 200 West area.

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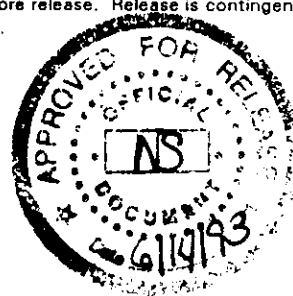
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1.0 INTRODUCTION

This description of work (DOW) details the field activities associated with aquifer testing in the uppermost unconfined aquifer beneath portions of the 200 West Area. This DOW serves as a test plan for those performing the work. It should be used in conjunction with the *Remedial Investigation/Feasibility Study Work Plan for the 200-UP-1 Groundwater Operable Unit, Hanford Site, Richland, Washington* (DOE-RL 1992a) for general investigation strategy and with *Environmental Investigations and Site Characterization Manual* (WHC 1988c) for specific procedures.

1.1 SCOPE

This DOW provides technical and administrative guidance for performing slug tests and possibly constant discharge tests in the uppermost aquifer system beneath the 200 West Area. Specific items included in the DOW are test design requirements, field operational requirements, implementation requirements, and data collection guidelines for the aquifer testing. The DOW was prepared in accordance with Environmental Investigation Instruction (EII) 1.14, "Preparation of Descriptions of Work" (WHC 1988c).

The field testing will consist of at least a slug test, a step-drawdown test (as needed), and in some cases a constant discharge test. The slug tests will be used to provide estimates of hydraulic conductivity in areas where little or no data are available, to confirm previous slug test results, and as a check against hydraulic conductivities determined from the constant discharge tests. Step-drawdown testing will be used to determine an optimum discharge rate for the constant discharge test. Constant discharge tests will be performed to estimate the hydraulic conductivity of the aquifer. These tests will usually be single-well tests, but when possible observation wells will be used.

Aquifer tests are planned at seven wells (Table 1 and Figure 1). The reasons for selecting these particular wells and locations are described in Sections 1.2 and 1.3. Field activities are expected to commence in April 1993 and be completed by June 1993. A site visit will be made to each test site prior to testing to determine the suitability of each well for aquifer testing. If a well is not suitable, the tests may be omitted. Another well may be substituted in this case, subject to all the requirements specified in this document.

1.2 DATA QUALITY OBJECTIVES

The primary data quality objective for the aquifer tests is to provide estimates of hydraulic conductivity to be used in the groundwater numerical model (DOE-RL 1992b). The hydraulic conductivities will enlarge the groundwater model database by filling in data gaps (i.e., areas where hydraulic conductivity values are currently unavailable), or confirming hydraulic conductivity values determined from previous tests. Specific data quality objectives for aquifer testing are listed in Table 4-4 in DOE-RL (1992a); specifically, hydraulic parameter estimates are constrained by the

limitations of available testing methodologies to approximate order-of-magnitude values.

The field program generally will consist of single-well constant discharge tests to evaluate aquifer hydraulic conductivities. This test method is expected to yield values of transmissivity that approach the true aquifer transmissivity. At sites where observation wells will be used, it may be possible to estimate other aquifer parameters, such as the vertical hydraulic conductivity and the storage coefficient. These later parameters will also be used in the groundwater model.

1.3 SITE SELECTION CRITERIA

In general, the test wells and locations were based on the data requirements of the groundwater numerical model (i.e., to confirm hydraulic conductivities and to fill in data gaps). Prominent consideration was also given to the area around the U-1 and U-2 cribs where the interim remedial measure is planned. However, the lack of existing wells in the U crib area precluded any testing directly downgradient.

Existing wells were used in all cases because of resource and time limitations. The installation of new characterization wells is costly and requires significant lead time to plan for drilling and aquifer testing. The selection criteria can be summarized as follows.

1. Only existing wells will be tested.
2. The wells must be screened or perforated in the top of the unconfined aquifer so that the data collected at each site will be consistent with other aquifer test results in the model database.
3. The test results should provide confirmatory values of hydraulic conductivity for data in the groundwater model database (which consists of primarily slug test results).
4. The test results should fill in data gaps for the groundwater model and in particular be useful for defining boundary conditions of the model.
5. Testing will be performed primarily in the eastern portion of 200 West Area, which is the general direction of contaminant movement from the 200 West Area and the primary area of concern for the groundwater model.
6. Better definition of the lateral extent of an east-west trending high hydraulic conductivity zone just north of the U-1 and U-2 cribs is desired.
7. Multiple wells should be used if possible, which generally provides more representative estimates of hydraulic conductivity, and may also supply additional parameters (vertical hydraulic conductivity and the storage coefficient) that can be incorporated into the groundwater model.

Using these criteria, seven test locations were selected (Table 2). Additional sites (to-be-determined wells) could be selected later if time permits, sufficient resources are still available, and other important data

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needs for the groundwater model are identified. Appendix A contains information on the construction of these wells.

A well assessment will be performed at each proposed test site prior to testing to determine the suitability of each well for testing. If one or more of the proposed wells is inadequate for testing, alternative locations may be chosen. Alternate wells will be chosen according to the criteria listed above and tested using the same general approach described in this DOW.

Table 1 lists the current proposed wells and general well completion information for each of the aquifer test wells. Figure 1 shows the locations of the wells in the 200 West Area. The nonpumping wells listed in Table 1 are observation wells, which may be close enough to a pumping well to warrant monitoring during the testing activities.

1.4 TESTING LIMITATIONS

Some of the aquifer tests will consist of single-well constant discharge tests. In one case (or maybe two), a multiple-well test will be performed. The multiple-well test(s) may furnish information on the vertical hydraulic conductivity and the storage coefficient of the aquifer. Some general test limitations are identified below.

- The test results will only apply to the top of the unconfined aquifer and should not be considered representative of the entire saturated thickness. This restriction is chosen by design to ensure consistency with past test results. Most historical aquifer testing was performed in the top of the unconfined aquifer, and it is data from these tests that support the groundwater model. This restriction is also a necessity because most of the wells in the 200 West Area are completed in the top of the unconfined aquifer, and aquifer testing will be conducted using existing wells.
- Aquifer testing will not be site-specific to the U-1 and U-2 cribs, which is the source of the several contaminant plumes and the attention of the interim remedial measure. Even though this was a criterion considered for selecting test wells, very few wells are present in this general area. Resource limitations precluded the installation of characterization wells near the cribs.
- The estimated hydraulic conductivity for the single-well tests will be approximations of the true hydraulic conductivity, because several key assumptions of the single-well test analysis are violated under the set test conditions. One significant assumption is the requirement for a fully penetrating well screen (or perforations). Analytical methods are available to handle this variation, but only for multiple-well tests.

Even with these limitations, the aquifer test results are expected to provide reasonable estimates of hydraulic conductivity for the top of the unconfined aquifer. Given (1) the proposed intent of the groundwater modelling effort (an evaluative/scoping tool); (2) the relatively large area

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covered by the model; and (3) the use of a plan-view two-dimensional model, the hydraulic conductivity data should meet the level of detail required by the groundwater model.

In addition, it is currently perceived that most of the contamination from the U-1 and U-2 cribs is situated at the top of the unconfined aquifer. If this is a correct assumption, then modeling the top of the unconfined aquifer is a reasonable effort for remedial alternatives.

It is suggested that future aquifer testing near the U-1 and U-2 cribs include vertical profiling of the hydraulic conductivity. This testing could be accomplished with two characterization wells spaced at an appropriate distance, so one of the wells could be used as an observation well. The wells also could be multifunctional, i.e., used for a pump-and-treat pilot test, for vertical groundwater sample profiling, etc.

2.0 GENERAL REQUIREMENTS

2.1 REQUIRED DOCUMENTS AND PROCEDURES

All work will be performed in accordance with the following documents and procedures:

- WHC-EP-0383, *Environmental Engineering, Technology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a)
- WHC-CM-7-7, *Environmental Investigations and Site Characterization Manual* (WHC 1988c)
 - EII 10.1, "Aquifer Testing"
 - EII 10.2, "Measurement of Groundwater Levels"
 - EII 10.3, "Purgewater Management"
 - EII 6.1, "Activity Reports of Field Operations"
 - EII 6.8, "Resource Protection Well Services."

2.2 HEALTH AND SAFETY

All personnel working to this description of work will have completed the 40-hour Hazardous Waste Site Worker training program and will perform all work in accordance with the following:

- WHC-CM-4-10, *Radiation Protection* (WHC 1988e)
- WHC-IP-0692, *Health Physics Procedures Manual* (WHC 1991)
- WHC-CM-4-11, *ALARA Program* (WHC 1988a)
- WHC-CM-4-3, *Industrial Safety Manual* (WHC 1987)

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- WHC-CM-7-5, *Environmental Compliance Manual* (WHC 1988b)
- Site-specific health and safety plan or job safety analysis.

3.0 TEST REQUIREMENTS

The following subsections describe specific requirements for the aquifer tests such as determination of pumping rates; the selection of the pump; the equipment setup; the length of each test; and baseline, pre-test, and post-test monitoring.

3.1 TEST TYPES

Ideally, hydraulic conductivity estimates from the slug test data should equal values calculated from the constant discharge test. However, slug test results are readily affected by near-borehole conditions that may not be representative of overall aquifer properties. Influences such as drilling effects, well completion activities, and natural formational heterogeneities can contribute to variations in the hydraulic conductivity. Slug tests are readily influenced by these factors. For this reason, constant discharge tests are planned along with the slug tests to confirm and estimate the hydraulic conductivity of the aquifer.

The ideal testing sequence will consist of an initial slug test (at the pumping well and all observation wells), a step-drawdown test, a constant discharge/recovery test, and a final slug test. The slug test and step-drawdown tests will provide preliminary information for planning and conducting the constant discharge test, including an initial estimate of hydraulic conductivity and an optimum rate of discharge.

At most of the wells, neither the hydraulic conductivity nor the transmissivity has been determined. One exception is well 299-W22-41, where the transmissivity was estimated to be 140 ft²/d from a previous slug test (WHC 1992). A constant discharge test has not been performed at this well.

At well 299-W22-41, and possibly 699-37-82A, observation wells will be available, making these multiple-well tests. Some historical information is available for aquifer testing in well 699-37-82A, reported in Graham et al. (1981). An evaluation of the Graham test data will be performed to determine if an additional aquifer test is necessary at this site.

The primary objective for the aquifer tests is to determine aquifer hydraulic parameters. For single-well constant-discharge tests, only the hydraulic conductivity (transmissivity) can be determined (an inherent limitation of the method). For multiple-well test(s), additional parameters such as the vertical hydraulic conductivity, the specific yield, and elastic storage coefficient may be estimated.

Slug tests will provide an initial estimate of the aquifer hydraulic conductivity. The slug test conductivities will be compared to conductivities

calculated from the constant discharge test to help evaluate the correspondence between these test types.

A pre-test site visit and well assessment is planned to verify the condition and adequacy of the older wells for testing and to check the status of the newer wells. During the well assessment the following tasks should be performed:

- Measure the depth to water
- Tag the bottom of the well
- Note any obstructions in the wells
- Draw a well-head diagram (a Polaroid picture is also recommended)
- Measure the distance to nearby wells (which should be located within 100 ft of the pumping well).

If the initial evaluation of the wells indicates that testing is not feasible (i.e., there is sand fill up, the desired interval is not accessible, or hydraulic head elevations are not distinct in wells completed as piezometers, etc.) the well will be eliminated as a test site, and no further evaluation is required. If the evaluation does show the well to be viable, the well may be further assessed by running a camera survey.

3.2 SEQUENCE OF FIELD ACTIVITIES

Field activities at each site will begin with the well assessment and, if favorable, end with the final slug test. Figure 4 is a generalized flow chart placing each activity in chronological order. Some of the field activities can be completed as a group: for example, most of the well assessments can be finished before any aquifer testing begins.

Aquifer testing will be initiated only after several administrative tasks are completed. These tasks include the following:

- A groundwater chemistry evaluation to determine how to handle purgewater produced during testing
- An environmental assessment to determine the impact of purgewater on endangered, threatened, or sensitive plant and animal species if water is to be disposed of to the ground (only outside the 200 West Area fence)
- A job safety analysis to determine the safety requirements for each site.

3.3 DISCHARGE RATES AND PUMP SELECTION

The primary purpose of the step-drawdown testing will be to estimate the optimal discharge rate for the longer term aquifer test. Two to five steps at 60 to 90 min each may be necessary to make this determination. A reasonable

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drawdown for the long-term test would be more than 5 ft in the pumping well, not exceeding 50% of the screen or perforated length, and at least 2 to 3 ft in the observation well (if available).

The final selection of the pump for each well will depend on the results of the step-drawdown tests. An initial best estimate of the discharge rate (and therefore pump selection) will be based on the estimated hydraulic conductivity from the slug test. The pump used for the step-test will be selected from drawdown projections based on the slug test results.

The pump (or riser pipe) should have a backflow (check) valve to prevent water in the pipe draining back into the aquifer after the pump is shut off.

3.4 EQUIPMENT SETUP

The wells will not require any structural modifications for aquifer testing. It may be advantageous to install a packer in the observation well during slug testing in the pumping well to eliminate wellbore storage effects, and thereby increase the measurement sensitivity.

For the step-drawdown tests and constant discharge tests, the pump should be installed within 5 ft of the bottom of the screen, or at a depth that is at least 3 to 5 ft below the level of maximum expected drawdown. This setting should provide an adequate buffer to prevent cavitation.

A calibrated transducer will be used in the pumping and observation wells for baseline monitoring, pre-test water-level monitoring, and during recovery monitoring. The transducer depth setting, the recording frequency, and the calibration requirements are contained in EII 10.1, "Aquifer Testing."

A laboratory or field calibrated flow measurement device (which may be an orifice) will be used to monitor the discharge rate. The measured error of the flow measurement device must not exceed $\pm 10\%$ of the total flow.

If a rotor meter-type flow meter is used for low flow rates (< 10 gal/min), the factory calibration is acceptable. The flow rate must be confirmed with a stop watch and container of known volume while running the test.

Field checks must be made to confirm proper operation of any flow measurement device. One useful field check would be using the weighing tank method, where the weight change of water is measured over a specific period of time.

Flow rates should be recorded about every 5 min at the start of the test, and at a maximum of 30- to 60-min intervals after the first 30 min. If a transducer can be used for recording flow rates (as with an orifice), the rate should be set to a logarithmic recording frequency at the start of the test with a maximum rate of every 30 to 60 min.

Flow measurement devices must be installed with the correct length of straight run pipe upstream and downstream from the device per the manufacturers recommendation. Expected flow rates in the 200 West Area are

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expected to range from 1 to 50 gal/min based on the estimated hydraulic conductivities (Figure 2).

3.5 TEST LENGTH

In general the constant discharge tests should run until the effects of delayed gravity drainage are minimal and a straight line is defined on a semi-log plot of time versus drawdown. It is anticipated that the test will run from 4 to 8 h, but may require as long as 1 day, depending on aquifer conditions. Final determination on the length of the test is at the discretion of the Aquifer Test Lead. The rationale for stopping the test will be recorded on the field activity report.

At wells where the transmissivities are relatively low and a larger diameter casing is present (8 in. or greater), borehole storage effects will dominate the early time data. Papadopoulos and Cooper (1967) give a criterion for estimating the amount of time that wellbore storage impacts the drawdown: $t < 25 r_c^2 / T$ (modified after Weekes 1977). In this equation, r_c = radius of well casing (L), and T = transmissivity (L/T). This equation can be used to estimate when the wellbore storage is no longer dominant. In the field a unit slope on a log-log graph of the data will indicate borehole storage is dominating the drawdown data.

3.6 BASELINE AND PRE-TEST MONITORING

Before initiating the slug test and starting the constant discharge test, baseline and pre-test water-level trends must be established. A pressure transducer recording frequencies of 1 h should be used to record baseline water-level trends for 3 days or longer. Steel tapes and electric tapes used for measuring water levels must meet the calibration/standardization requirements in EII 10.2. Barometric monitoring will also be included over the span of the testing, beginning at the time of the baseline monitoring. In addition, if time warrants, a downhole flow meter may be tested to ascertain groundwater flow direction and velocity.

3.7 POST-TEST MONITORING

After pumping is terminated, water-level data collection will continue throughout the recovery period until a dynamic equilibrium is re-established, or the recovery trend is clearly defined. In most cases full recovery is expected to occur in about 2 or 3 days. The final slug test can then be performed at the well.

3.8 CONTROL OF PURGEWATER

Purgewater will be handled in two ways, depending on the quality of the groundwater at the test well and the location of the test. Within the 200 West Area, all generated purgewater must be contained and transported to a predetermined disposal facility (WHC 1990b). Outside of the 200 West Area, if groundwater at the test well is designated as uncontaminated, the water can be

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released to the ground surface. It is recommended that the water be disposed of at least 100 ft away from the wellhead.

The quality of the groundwater will be documented for each well prior to testing, and thereby the proper method of disposal determined. Constant discharge tests will not be conducted at wells where the purgewater is contaminated and the hydraulic conductivity of the aquifer is relatively high, because of the logistics in containing large volumes of purgewater. Even in wells where the volume of contaminated purgewater would be small, it may not be possible to test if the purgewater cannot be disposed. A sample of the purgewater should be collected at the end of each test for information only, and analyzed at least for nitrate and total activity.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

Data quality is controlled primarily by this DOW and adherence to EII 10.1 on Aquifer Testing. The data at the test wells can be reproduced if the initial test fails by re-running the test. Some of the test sites outside of the 200 West Area may require an evaluation of the impact to endangered, threatened, and sensitive species if it is decided that groundwater can be disposed to the ground.

The quality assurance documents that cover the test activities are the *Quality Assurance Manual* (WHC 1988d) and the *Environmental Engineering, Technology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a). This aquifer DOW and the aquifer testing is assigned an impact level of 3Q.

5.0 SCHEDULE

Aquifer testing is expected to begin in April 1993 and be completed in June 1993. Testing should be completed as soon as possible to allow enough time for final data reduction and analysis, and to provide input into the final modeling report that is due at the end of the fiscal year. Well assessment activities can begin any time after the applicable administrative tasks listed above are completed.

6.0 REFERENCES

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- WHC, 1988e, *Radiation Protection*, WHC-CM-4-10, Westinghouse Hanford Company, Richland, Washington.
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- WHC, 1992, *Hydrogeologic Model for the 200 West Groundwater Aggregate Area*, WHC-SD-EN-TI-014, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

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Figure 1. Location Map for the Proposed Aquifer Test Wells in the 200 West Area.

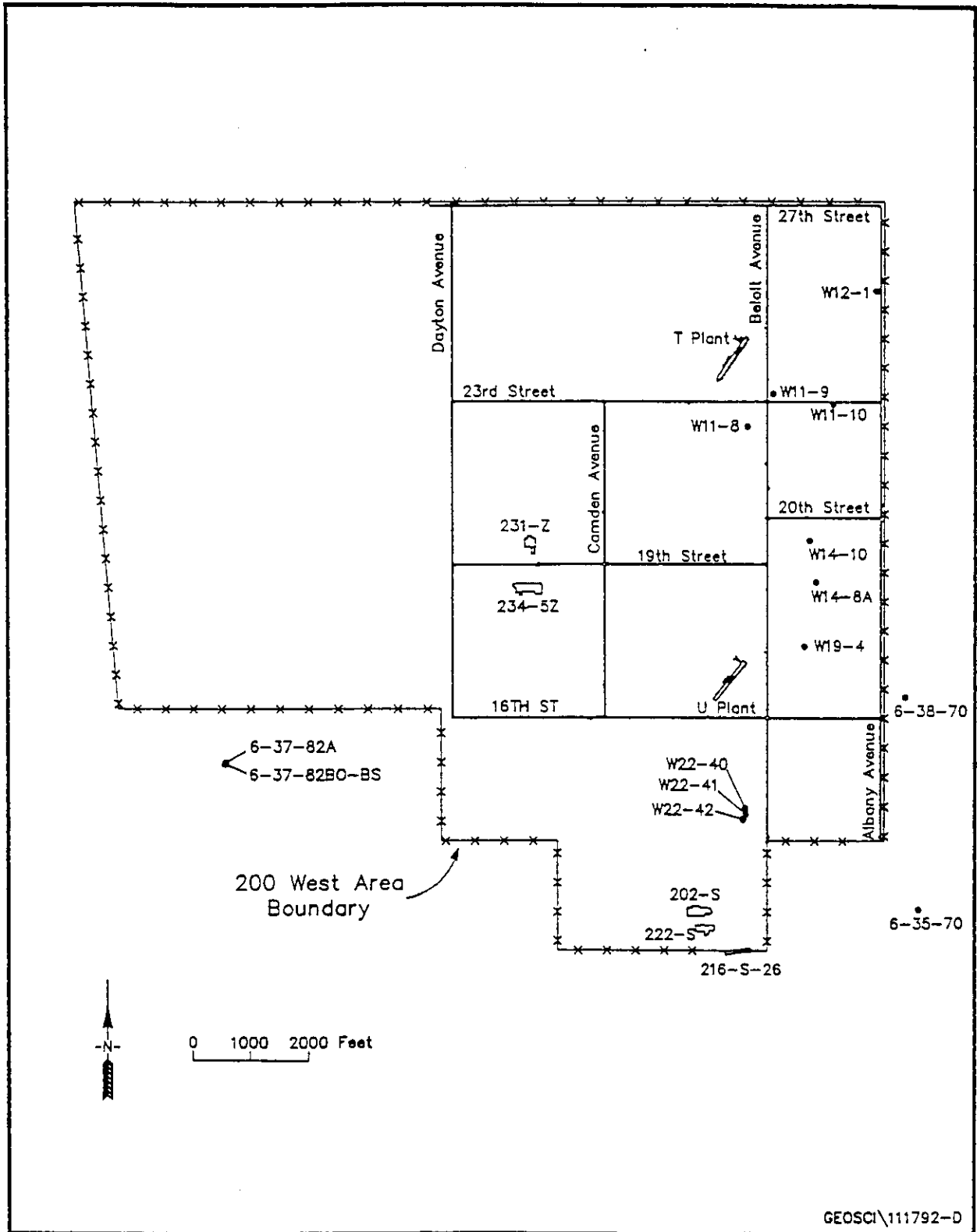
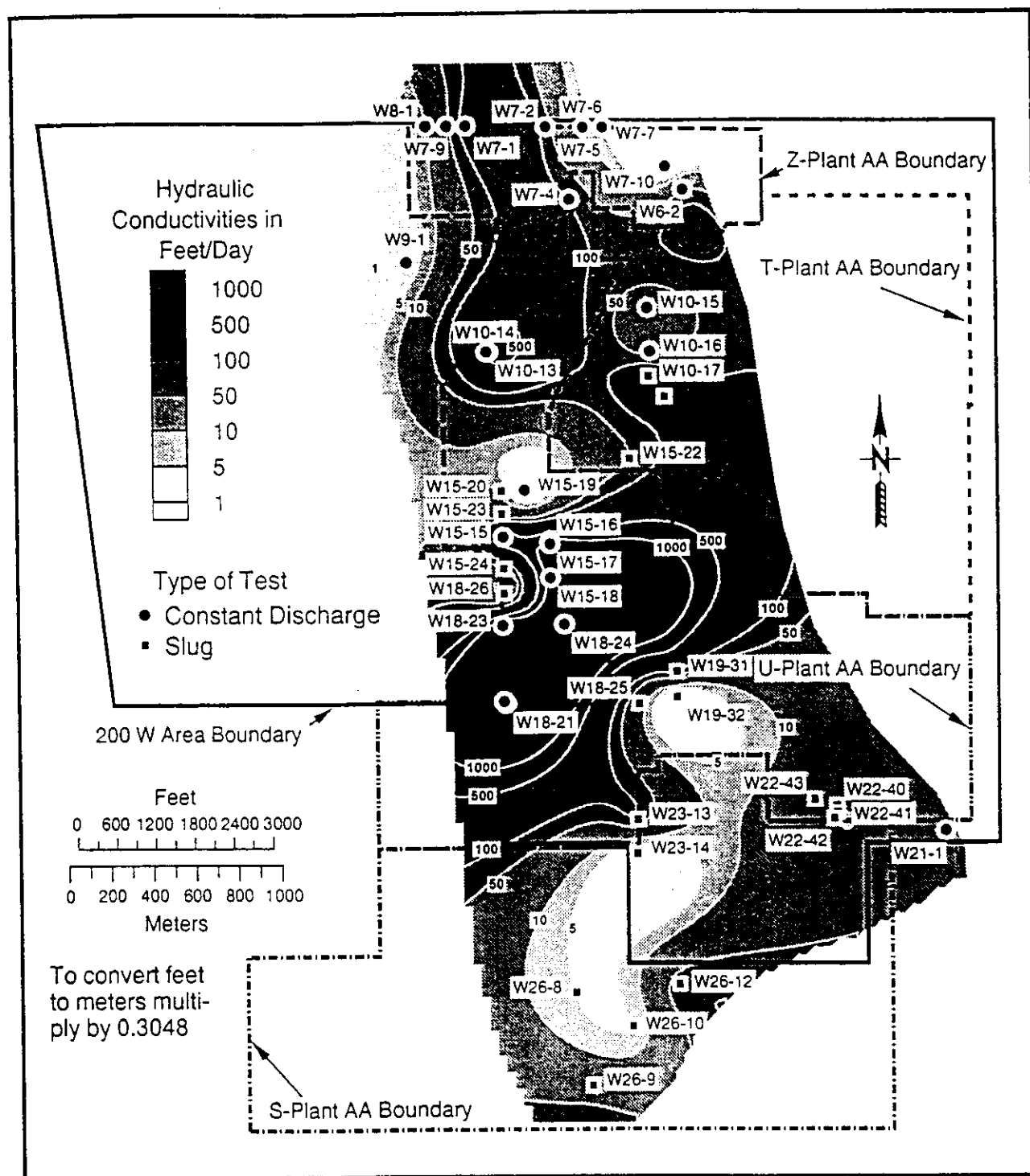


Figure 2. Hydraulic Conductivity Distribution Map of the 200 West Area (after WHC 1992).



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Legend for Water Table Map (June, 1991)

- Well Location and Elevation of Top of Water Table June, 1991 (Meters above Mean Sea Level)
- - - Elevation Contour (Contour Interval = 0.5 m)

Map Labels:

- Z Plant AA Boundary
- T Plant AA Boundary
- U Plant AA Boundary
- S Plant AA Boundary
- 200 West Area Boundary

Elevation Contours (meters): 137, 138, 139, 140, 141, 142

Well Elevations (meters): 140.21, 139.29, 139.60, 139.80, 139.90, 140.51, 141.12, 141.43, 142.04, 142.34, 142.65, 142.95, 143.12, 143.24, 143.38, 143.51, 143.65, 143.79, 143.93, 144.07, 144.21, 144.35, 144.49, 144.63, 144.77, 144.91, 145.05, 145.19, 145.33, 145.47, 145.61, 145.75, 145.89, 146.03, 146.17, 146.31, 146.45, 146.59, 146.73, 146.87, 147.01, 147.15, 147.29, 147.43, 147.57, 147.71, 147.85, 147.99, 148.13, 148.27, 148.41, 148.55, 148.69, 148.83, 148.97, 149.11, 149.25, 149.39, 149.53, 149.67, 149.81, 149.95, 150.09, 150.23, 150.37, 150.51, 150.65, 150.79, 150.93, 151.07, 151.21, 151.35, 151.49, 151.63, 151.77, 151.91, 152.05, 152.19, 152.33, 152.47, 152.61, 152.75, 152.89, 153.03, 153.17, 153.31, 153.45, 153.59, 153.73, 153.87, 154.01, 154.15, 154.29, 154.43, 154.57, 154.71, 154.85, 154.99, 155.13, 155.27, 155.41, 155.55, 155.69, 155.83, 155.97, 156.11, 156.25, 156.39, 156.53, 156.67, 156.81, 156.95, 157.09, 157.23, 157.37, 157.51, 157.65, 157.79, 157.93, 158.07, 158.21, 158.35, 158.49, 158.63, 158.77, 158.91, 159.05, 159.19, 159.33, 159.47, 159.61, 159.75, 159.89, 160.03, 160.17, 160.31, 160.45, 160.59, 160.73, 160.87, 161.01, 161.15, 161.29, 161.43, 161.57, 161.71, 161.85, 161.99, 162.13, 162.27, 162.41, 162.55, 162.69, 162.83, 162.97, 163.11, 163.25, 163.39, 163.53, 163.67, 163.81, 163.95, 164.09, 164.23, 164.37, 164.51, 164.65, 164.79, 164.93, 165.07, 165.21, 165.35, 165.49, 165.63, 165.77, 165.91, 166.05, 166.19, 166.33, 166.47, 166.61, 166.75, 166.89, 167.03, 167.17, 167.31, 167.45, 167.59, 167.73, 167.87, 168.01, 168.15, 168.29, 168.43, 168.57, 168.71, 168.85, 168.99, 169.13, 169.27, 169.41, 169.55, 169.69, 169.83, 169.97, 170.11, 170.25, 170.39, 170.53, 170.67, 170.81, 170.95, 171.09, 171.23, 171.37, 171.51, 171.65, 171.79, 171.93, 172.07, 172.21, 172.35, 172.49, 172.63, 172.77, 172.91, 173.05, 173.19, 173.33, 173.47, 173.61, 173.75, 173.89, 174.03, 174.17, 174.31, 174.45, 174.59, 174.73, 174.87, 175.01, 175.15, 175.29, 175.43, 175.57, 175.71, 175.85, 175.99, 176.13, 176.27, 176.41, 176.55, 176.69, 176.83, 176.97, 177.11, 177.25, 177.39, 177.53, 177.67, 177.81, 177.95, 178.09, 178.23, 178.37, 178.51, 178.65, 178.79, 178.93, 179.07, 179.21, 179.35, 179.49, 179.63, 179.77, 179.91, 180.05, 180.19, 180.33, 180.47, 180.61, 180.75, 180.89, 181.03, 181.17, 181.31, 181.45, 181.59, 181.73, 181.87, 182.01, 182.15, 182.29, 182.43, 182.57, 182.71, 182.85, 182.99, 183.13, 183.27, 183.41, 183.55, 183.69, 183.83, 183.97, 184.11, 184.25, 184.39, 184.53, 184.67, 184.81, 184.95, 185.09, 185.23, 185.37, 185.51, 185.65, 185.79, 185.93, 186.07, 186.21, 186.35, 186.49, 186.63, 186.77, 186.91, 187.05, 187.19, 187.33, 187.47, 187.61, 187.75, 187.89, 188.03, 188.17, 188.31, 188.45, 188.59, 188.73, 188.87, 189.01, 189.15, 189.29, 189.43, 189.57, 189.71, 189.85, 189.99, 190.13, 190.27, 190.41, 190.55, 190.69, 190.83, 190.97, 191.11, 191.25, 191.39, 191.53, 191.67, 191.81, 191.95, 192.09, 192.23, 192.37, 192.51, 192.65, 192.79, 192.93, 193.07, 193.21, 193.35, 193.49, 193.63, 193.77, 193.91, 194.05, 194.19, 194.33, 194.47, 194.61, 194.75, 194.89, 195.03, 195.17, 195.31, 195.45, 195.59, 195.73, 195.87, 196.01, 196.15, 196.29, 196.43, 196.57, 196.71, 196.85, 196.99, 197.13, 197.27, 197.41, 197.55, 197.69, 197.83, 197.97, 198.11, 198.25, 198.39, 198.53, 198.67, 198.81, 198.95, 199.09, 199.23, 199.37, 199.51, 199.65, 199.79, 199.93, 200.07, 200.21, 200.35, 200.49, 200.63, 200.77, 200.91, 201.05, 201.19, 201.33, 201.47, 201.61, 201.75, 201.89, 202.03, 202.17, 202.31, 202.45, 202.59, 202.73, 202.87, 203.01, 203.15, 203.29, 203.43, 203.57, 203.71, 203.85, 203.99, 204.13, 204.27, 204.41, 204.55, 204.69, 204.83, 204.97, 205.11, 205.25, 205.39, 205.53, 205.67, 205.81, 205.95, 206.09, 206.23, 206.37, 206.51, 206.65, 206.79, 206.93, 207.07, 207.21, 207.35, 207.49, 2

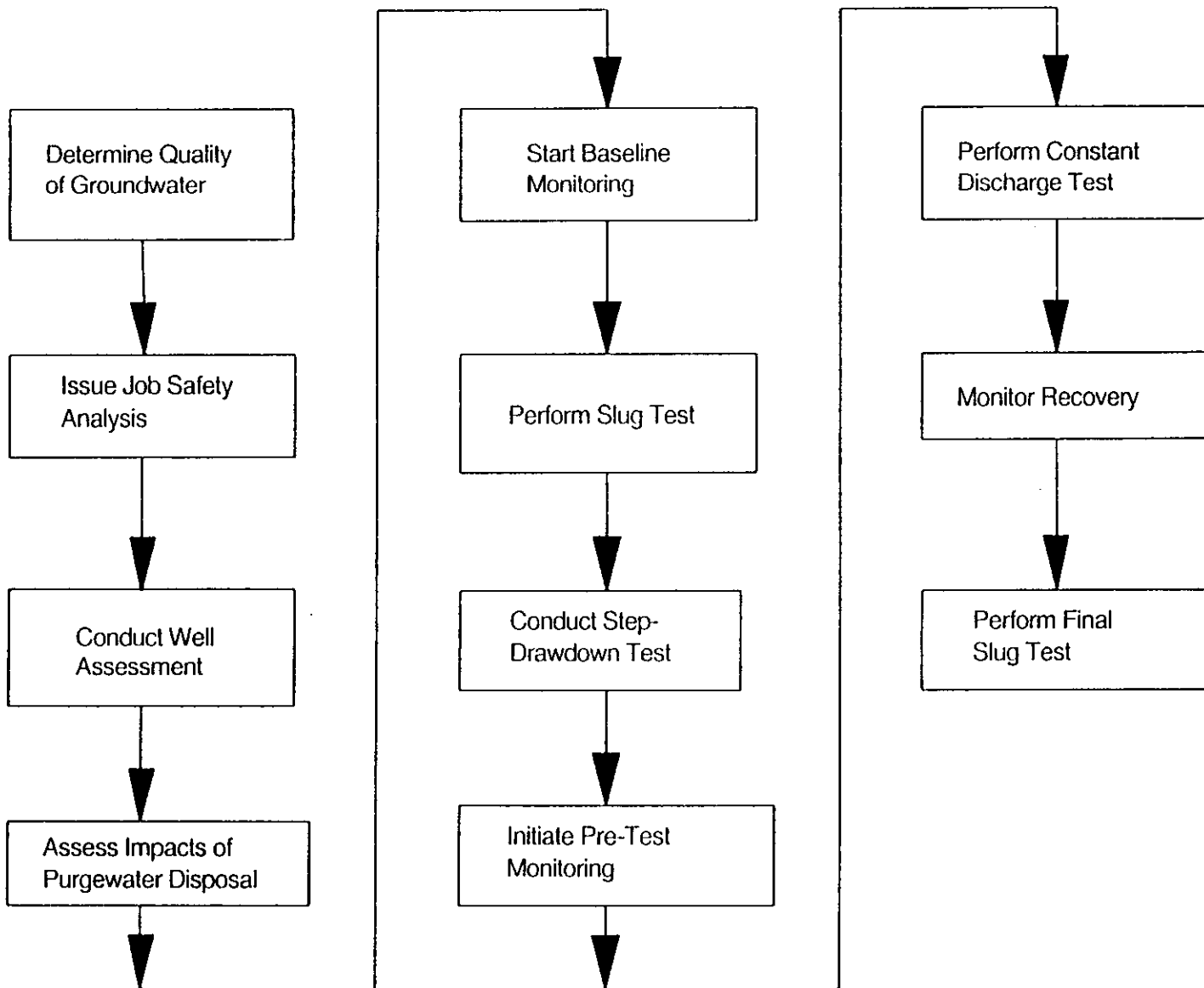
Figure 4. Flow Chart Showing the Sequencing of
Aquifer Test Activities.

Table 1. Well Construction Summary Information for the Aquifer Test Wells (see Figure 1 for locations).

PERMANENT WELL #	END DRILLING DATE	COMPLETION DEPTH (ft)	TOTAL DEPTH (ft)	DEPTH TO WATER (ft)	SCREEN INTERVAL (ft)	SANDPACK INTERVAL (ft)	ELEVATION BRASS CAP	CASING SIZE (in)
299-W14-10*	JUN 81	~325	330	263, 1991	260-275P	ND	ND	8"-330 10"-242
299-W11-10*	MAR 56	305	307	270, 1991	~256-304P	ND	~726.8	8"-305
299-W12-1*	APR 56	~310	314	273, 1991	~274-309P	ND	~724.2	8"-310
299-W11-8&	NOV 53	313	315	260, 1965	260-310P	ND	ND	8"-313
299-W11-9&	FEB 54	297	297	262, 1991	6" Liner 275-297P	ND	~721	8"-270 6"270-297
699-37-82A*	FEB 62	408?	408	ND	400-408?	ND	636.95	1.5"
699-37-82B0+I	OCT 64	184?	296?	ND	165-185	ND	ND	1.5"
699-37-82BP+I	MAY 64	344?	560?	ND	540-560	ND	636.30	1.5"
699-37-82BQ+I	MAY 64	184	410	ND	390-410	ND	636.30	1.5"
699-37-82BR+I	MAY 64	?	330	ND	310-330	ND	636.30	1.5"
699-37-82BS+I	MAY 64	414?	250?	ND	230-250	ND	636.50	1.5"
299-W22-41*	MAY 90	245	245	231, 1991	224-245 wire wrap 5 slot	220-243 40-100	688.77	10"-132 8"-244
299-W22-40+	MAY 90	244	245	231, 1992	224-244 wire wrap 10 slot	218-242 40	689.22	10"-143 8"-245
299-W22-42+	MAY 90	243	243	230, 1991	223-243 wire wrap 10 slot	219-243 40	688.20	10"-137 8"243
699-35-70*1	SEP 48	253	325	240, ?	235-320P 6" Liner 233-253	ND	693.72	8"-?
699-38-70*1	JUN 57	300	413	270, 1987	255-380P Plug @300	ND	ND	8"

ND=Not Documented

P=Perforations

*=pumping well

+=observation well

&=alternate pumping well

I=graphic construction information not available

?=interpretation of construction information is questionable

All other wells on table are for information, due to their location near a test well.

Table 2. Summary Table of Criteria for Selecting Test Wells.

Selection criteria	299-W12-1	299-W11-10	2939-W14-10	299-W22-41	699-W38-70	699-W35-70	699-37-82A
Existing Well	X	X	X	X	X	X	X
Screened at Top of Aquifer	X	X	X	X	X	X	X
Near U-1/ U-2 Crib			X	X	X	X	
Confirms Conductivity				X			X
Fills Data Gap	X	X	X		X	X	X
Eastern Side of 200 West	X	X	X		X	X	
Defines High Conductivity Area			X				X
Multiple Wells				X			X

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APPENDIX A

WELL CONSTRUCTION AND COMPLETION SUMMARIES

Most of the proposed aquifer test wells were constructed before 1981. Only one well, 299-W22-41, was completed in accordance with the Washington State Department of Ecology construction standards (Chapter 173-160 WAC, 1990). Table 1 lists information on well completions. This appendix contains as-builts and well summaries (as available) for the proposed test wells.

Many of the wells were constructed of 8-in. carbon steel casing, which was perforated at a specific interval(s) of interest at the time of completion. One well, 299-W22-41, was completed in accordance with Washington State well construction standards. Construction materials in this well included 4-in. stainless steel pipe and a continuous wire-wrap 10-slot stainless steel screen. The completion interval for this well was the top 20 ft of the unconfined aquifer.

Most of the wells were drilled using a cable tool drilling rig. Some wells have been modified through time by the addition of liners and plugs. The current status and condition of the wells will not be known until a site visit is made and in some instances, a camera survey is conducted. After the well assessment, a decision will then be made on whether the well is suitable for testing. The criteria for this decision are listed in Section 3.2.

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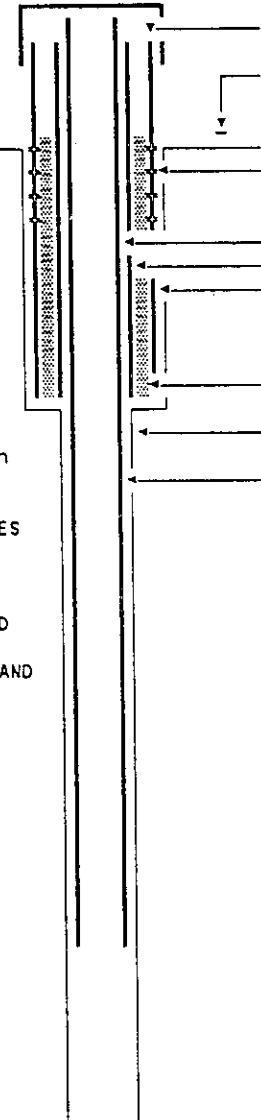
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WELL CONSTRUCTION AND COMPLETION SUMMARY		
Drilling Method: <u>Cable tool</u> Fluid Used: <u>Water</u> Driller's Name: <u>Close/Gage</u> Drilling Company: <u>Bach Drilling Co</u> Date Started: <u>01Dec59</u>	Sample Drive barrel Method: <u>Hard tool</u> Additives Used: <u>Not documented</u> WA State Lic Nr: <u>Not documented</u> Company Location: <u>Yakima, WA</u> Date Complete: <u>15Feb60</u>	WELL NUMBER: <u>299-W19-4</u> Hanford Coordinates: N/S <u>N 39,000</u> E/W <u>W 71,999</u> State Coordinates: N <u>444,000</u> E <u>2,223,000</u> Start Card #: <u>Not documented</u> T <u> </u> R <u> </u> S <u> </u> Elevation Ground surface (ft): <u>714.0 Estimated</u>
Depth to water: <u>270-ft Feb60</u> (Ground surface) <u>255.2-ft Dec91</u>		
GENERALIZED Driller's STRATIGRAPHY Log		
0-4: SAND 4-15: GRAVEL 15-30: GRAVEL boulders 30-45: SAND & GRAVEL 45-75: GRAVEL & SAND 75-105: SAND 105-115: Hard SAND with hard fine SILT 115-169: SILT & SAND 169-200: Yellow CLAY 200-215: CLAY with small GRAVEL 215-220: CLAY 220-225: Brown CLAY 225-230: CLAY 230-240: CLAY & GRAVEL 240-262: CLAY 262-295: GRAVEL & CLAY 295-300: GRAVEL 300-305: GRAVEL & CLAY 305-315: GRAVEL & SAND 315-335: SAND, GRAVEL & CLAY 335-345: BOULDERS, GRAVEL 345-350: BOULDERS, SAND & CLAY (Cemented gravel) 350-365: BOULDERS, GRAVEL, SAND 365-385: BOULDERS, GRAVEL 385-443: GRAVEL, SAND & CLAY 443-451: CLAY 451-455: SAND & CLAY 455-470: GRAVEL, SAND & CLAY 470-490: GRAVEL, basalt BOULDERS 490-495: BOULDERS, GRAVEL & SAND 495-505: Cement GRAVEL 505-525: CLAY to sandy CLAY 525-535: Sandy GRAVEL 535-539: SAND 539-545: SAND & BASALT 545-550: BASALT		Elevation of reference point: <u>(715.26-ft)</u> (top of casing) Height of reference point above <u>(1.3-ft)</u> ground surface Depth of surface seal <u>[ND]</u> Type of surface seal: <u>None documented</u> I.D. of riser pipe: <u>[8-in]</u> Type of riser pipe: <u>Carbon steel</u> Diameter of borehole: <u>[9-in nom]</u> Depth top of perforations: <u>[255-ft]</u> <u>255-443-ft, 2 cuts/rd/ft</u> <u>465-485 and 520-535-ft ND</u> Probable cement plug at 350-ft Installation not documented Depth bottom of perforations: <u>[535-ft]</u> Depth bottom of casing: <u>[539-ft]</u> Depth bottom of borehole: <u>[550-ft]</u>
REMEDIATION: Jun64, by Vincent Perforated 465-485 and 520-535-ft Installed three piezometer tubes to 410, 480 and 540-ft and gravel pack. Tubes were later removed. Details/date were not documented.		
Drawing By: <u>RKL/2W19-04.ASB</u> Date: <u>19Jun92</u> Reference: <u>HANFORD WELLS</u>		

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-W19-4

WELL DESIGNATION : 2-W19-4
 CERCLA UNIT : 200 Aggregate Area Management Study
 RCRA FACILITY : Not applicable
 HANFORD COORDINATES : N 39,000 W 71,999
 LAMBERT COORDINATES : N 444,000 E 2,223,000
 DATE DRILLED : Feb60
 DEPTH DRILLED (GS) : 550-ft
 MEASURED DEPTH (GS) : Not documented
 DEPTH TO WATER (GS) : 270-ft Feb60;
 : 255.2-ft, Dec91
 CASING DIAMETER : 8-in, +1.3-539-ft
 ELEV TOP CASING : 715.26-ft
 ELEV GROUND SURFACE : 714.0-ft, Estimated
 PERFORATED INTERVAL : 255-443 and 465-485-ft
 SCREENED INTERVAL : Not applicable
 COMMENTS : FIELD INSPECTION, 09May91,
 : 8-in carbon steel casing.
 : No pad, No posts, capped and locked.
 : Identification stamped on brass cap.
 : Not in radiation zone.
 : OTHER: Well formerly contained five 1½-in piezometers, 299W-19-40,P,Q,R and S.
 : All were removed, date not documented. Well apparently now has a cement plug
 : at ~350-ft.
 AVAILABLE LOGS : Driller
 TV SCAN COMMENTS : Not applicable
 DATE EVALUATED : Not applicable
 EVAL RECOMMENDATION : Not applicable
 LISTED USE : Separations area water level measurement, 15Jan64-01Dec91
 : Not on water sample schedule
 PUMP TYPE : None documented
 MAINTENANCE :

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WELL CONSTRUCTION AND COMPLETION SUMMARY			
Drilling Method: <u>Cable tool/rotary core</u> Fluid Used: <u>Water/Drill mud</u> Driller's Name: <u>Baker/Hendrickson</u> Company: <u>Hatch/Boyles Bros</u> Date <u>Cable tool/Core</u> Started: <u>17Nov76/20Dec76</u>	Sample Method: <u>Hard tool/core</u> Additives Used: <u>Bentonite</u> WA State Lic Nr: <u>Not documented</u> Company Location: <u>Pasco/Spokane</u> Date <u>Cable tool/Core</u> Complete: <u>02Dec76/09Feb77</u>	WELL NUMBER: <u>299-W14-8A</u> Hanford Coordinates: N/S <u>N 40,105</u> E/W <u>W 71,788</u> State Coordinates: N <u>449,222.50</u> E <u>2,223,434.22</u> Start Card #: <u>Not documented</u> T <u> </u> R <u> </u> S <u> </u> Elevation Ground surface (ft): <u>721.3 Estimated</u>	
Depth to water: <u>ND</u> (Ground surface) GENERALIZED Driller's STRATIGRAPHY Log 0-196-ft		 <p> Elevation of reference point: <u>[723.48-ft]</u> (top of 6-in casing) Height of reference point above <u>[2.2-ft]</u> ground surface Depth of surface seal <u>[20-ft]</u> Perforated 0-20-ft, 4 cuts/rd/ft NX 3 1/2-in carbon steel casing to 473-ft 4-in carbon steel casing to 196-ft 6-in carbon steel casing to 196-ft Cement grout Diameter of borehole: <u>[3 3/4-in]</u> Type of filler: <u>Viscous drilling mud</u> Depth bottom of borehole: <u>[563-ft]</u> </p>	
0-5: SAND 5-20: Gravelly SAND 20-45: GRAVEL & SAND 45-90: Gravelly SAND 90-168: SAND, SILT lenses 155-157 and 160-168-ft 168-178: SILT 178-196: Ringold <u>▼ GEOLOGIST'S LOG ▼</u> 196-228: GRAVEL, COBBLES and PEBBLES 228-238: PEBBLES, COBBLES, SAND 238-242: No recovery 242-262: GRAVEL, COBBLES, some SAND 262-280: SAND, some CaCO ₃ and oxidation 280-339: SAND to gravelly SAND to sandy GRAVEL 339-344: Medium to large GRAVEL, COBBLES 344-351: Fine-medium GRAVEL, COBBLES 351-357: SAND, GRAVEL, COBBLES 357-372: Medium-large GRAVEL 372-382: Large GRAVEL, medium-fine SAND 382-408: Medium-large GRAVEL, COBBLES 408-413: Medium-large GRAVEL, medium SAND 413-418: CLAY stringer 418-436: Medium-large GRAVEL, PEBBLES coarse-medium SAND 436-447: Sandy GRAVEL 447-456: Fine-medium GRAVEL 456-465: Sandy GRAVEL 465-532: Medium-large sandy GRAVEL 532-536: Basalt COBBLES, 20-in SAND stringer 536-546: Vesicular BASALT, some CLAY 546-563: BASALT			
Drawing By: <u>RKL/2W14-08A.ASB</u> Date: <u>19Jun92</u> Reference: <u>HANFORD WELLS</u>			

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WELL DESIGNATION      : 299-W14-8A
CERCLA UNIT           : 200 Aggregate Area Management Study
RCRA FACILITY         : Not applicable
HANFORD COORDINATES   : N 40,105 W 71,788
LAMBERT COORDINATES   : N 449,222 E 2,223,434
DATE DRILLED          : Feb77
DEPTH DRILLED (GS)    : 563-ft
MEASURED DEPTH (GS)   : Not documented
DEPTH TO WATER (GS)   : Not documented
CASING DIAMETER       : 6-in carbon steel, ~+1.0-196-ft;
                      : 4-in carbon steel, ~+1-196-ft;
                      : 3½-in carbon steel, ~+1-473-ft
ELEV TOP CASING        : 723.48-ft
ELEV GROUND SURFACE    : 721.3-ft, Estimated
PERFORATED INTERVAL   : 0-20-ft
SCREENED INTERVAL      : Not applicable
COMMENTS               : FIELD INSPECTION, 22Apr91,
                      : 6, 4 and 3½-in carbon steel casings.
                      : No pad, No posts, not capped, not locked.
                      : 1½-in PVC pipe stuck in hole.
                      : No permanent identification.
                      : OTHER: Completed as DH-13A corehole.
AVAILABLE LOGS         : Driller/Geologist
TV SCAN COMMENTS      : Not applicable
DATE EVALUATED        : Not applicable
EVAL RECOMMENDATION    : Not applicable
LISTED USE             : No water level data
                      : Not on water sample schedule
PUMP TYPE              : None documented
MAINTENANCE           :

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WELL CONSTRUCTION AND COMPLETION SUMMARY			
Drilling Method: <u>Cable tool</u> Fluid Used: <u>Water</u> Driller's Name: <u>Bultena/Graham</u> Company: <u>Hatch Drilling Co.</u> Date Started: <u>27May81</u> Redrill <u>23Jun81</u>	Sample Drive barrel Method: <u>Hard tool</u> Additives Used: <u>Not documented</u> WA State Lic Nr: <u>Not documented</u> Company Location: <u>Pasco, WA</u> Date Complete: <u>31Jul81</u>	WELL NUMBER: <u>299-W14-10</u> TEMPORARY WELL NO: _____ Hanford Coordinates: N/S <u>N 40,810</u> E/W <u>W 71,905</u> State Coordinates: N <u>445,927</u> E <u>2,223,315</u> Start Card #: <u>Not documented</u> T _____ R _____ S _____ Elevation Ground surface (ft): <u>Not documented</u>	
Depth to water: <u>265-ft Apr85</u> (Ground surface) <u>263.5-ft Apr91</u>			
GENERALIZED STRATIGRAPHY Driller's Log for Redrilled hole		Elevation of reference point: [<u>ND</u>] (top of casing) Height of reference point above [<u>2.2-ft</u>] ground surface Depth of surface seal [<u>20-ft</u>] Type of surface seal: <u>Bentonite inside 12-in casing</u> I.D. of surface casing [<u>12-in</u>] (Pulled during installation of surface seal) Borehole diameter: 0-20-ft, 13-in nominal 20-270-ft, 11-in nominal I.D. of riser pipe: <u>10 & 8-in carbon steel</u> Type of filler: <u>Metal seal, location not documented</u> 10-in casing to ~242-ft Borehole diameter: 270-330-ft, 9-in nominal Depth top of perforations: [<u>260-ft</u>] Description of perforations: <u>260-275-ft, 46 shaped charges</u> <u>22.7 gram charges</u> Depth bottom of perforations: [<u>275-ft</u>] Cement plug, 325-327-ft Depth bottom of 8-in casing Depth bottom of borehole: [<u>330-ft</u>]	
0-45: COBBLES and SAND 45-57: SAND w/small amounts GRAVEL 57-146: Brown & black SAND, lenses of SILT 146-159: Brown SAND and SILT 159-230: Compacted GRAVEL 230-270: Cemented GRAVEL and COBBLES (Ringold) consolidated GRAVEL 270-285: SILT & SAND-SAND & SILT 285-295: Loose heaving SAND 295-324: SAND SILT (heaving SAND) 324-328: SAND-SILT mixed coarse GRAVEL 328-330: 90% fine SAND, 10% small GRAVEL		PERFORATIONS: 28Dec81, by McGhan Explosive perforation by shaped charge detonation	
Drawing By: <u>RKL/2W14-10.ASB</u> Date: <u>19Jun92</u> Reference: <u>HANFORD WELLS</u>			

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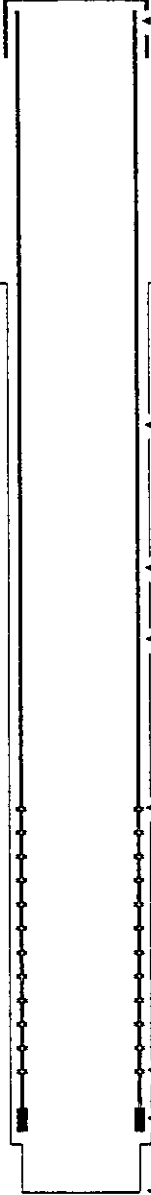
WELL DESIGNATION      : 299-W14-10
CERCLA UNIT           : 200 Aggregate Area Management Study
RCRA FACILITY         : Not applicable
HANFORD COORDINATES   : N 40,810 W 71,905
LAMBERT COORDINATES   : N 445,927 E 2,223,315
DATE DRILLED          : Jul81
DEPTH DRILLED (GS)    : 330-ft
MEASURED DEPTH (GS)   : 315.5-ft, Apr91
DEPTH TO WATER (GS)   : 265-ft, Aug85;
                       : 263.5-ft, Apr91
CASING DIAMETER       : 10-in carbon steel, 0-242-ft;
                       : 8-in carbon steel, +2.9-330-ft
ELEV TOP CASING        : Not documented
ELEV GROUND SURFACE    : Not documented
PERFORATED INTERVAL   : 260-275-ft
SCREENED INTERVAL      : Not applicable
COMMENTS               : FIELD INSPECTION, 09May91,
                       : 8-in carbon steel casing.
                       : 2-ft cement pad, No posts, capped and locked.
                       : Well identification stamped on brass cap in pad.
                       : Not in radiation zone.
                       : OTHER: Perforation done by explosive shaped charges.
AVAILABLE LOGS         : Driller
TV SCAN COMMENTS      : Not applicable
DATE EVALUATED         : Not applicable
EVAL RECOMMENDATION    : Not applicable
LISTED USE             : Water levels measured, 08Mar82-12Apr90
                       : PNL Semiannual, WHC Quarterly water sample schedule
PUMP TYPE              : Electric submersible
MAINTENANCE            :

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WELL CONSTRUCTION AND COMPLETION SUMMARY			
Drilling Method: <u>Cable tool</u> Drilling Fluid Used: <u>Water</u> Driller's Name: <u>Chausse</u> Drilling Company: <u>Not documented</u> Date Started: <u>20Mar56</u>	Sample Method: <u>Hard tool nom</u> Additives Used: <u>Not documented</u> WA State Lic Nr: <u>Not documented</u> Company Location: <u>Not documented</u> Date Complete: <u>16Apr56</u>	WELL NUMBER: <u>299-W11-10</u> TEMPORARY Hanford WELL NO: <u>361-T-24</u> Coordinates: N/S <u>N 43,150</u> E/W <u>W 71,500</u> State Coordinates: N <u>448,268</u> E <u>2,223,714</u> Start Card #: <u>Not documented</u> T <u> </u> R <u> </u> S <u> </u> Elevation Ground surface (ft): <u>726.8 Estimated</u>	
Depth to water: <u>279-ft Apr56</u> (Ground surface) <u>270.6-ft Dec91</u>			
GENERALIZED Driller's STRATIGRAPHY Log	<div style="display: flex; align-items: center;"> <div style="flex: 1; border-left: 1px solid black; border-right: 1px solid black; position: relative; height: 400px; margin: 0 10px;"> <!-- Stratigraphic Log --> <div style="position: absolute; top: 0; left: 0; right: 0; height: 20px; background-color: #f0f0f0;"></div> <div style="position: absolute; top: 20px; left: 0; right: 0; height: 20px; background-color: #d0d0d0;"></div> <div style="position: absolute; top: 40px; left: 0; right: 0; height: 20px; background-color: #c0c0c0;"></div> <div style="position: absolute; top: 60px; left: 0; right: 0; height: 20px; background-color: #a0a0a0;"></div> <div style="position: absolute; top: 80px; left: 0; right: 0; height: 20px; background-color: #808080;"></div> <div style="position: absolute; top: 100px; left: 0; right: 0; height: 20px; background-color: #606060;"></div> <div style="position: absolute; top: 120px; left: 0; right: 0; height: 20px; background-color: #404040;"></div> <div style="position: absolute; top: 140px; left: 0; right: 0; height: 20px; background-color: #202020;"></div> <div style="position: absolute; top: 160px; left: 0; right: 0; height: 20px; background-color: #000000;"></div> <div style="position: absolute; top: 180px; left: 0; right: 0; height: 20px; background-color: #000000;"></div> <div style="position: absolute; top: 200px; left: 0; right: 0; height: 20px; background-color: #000000;"></div> <div style="position: absolute; top: 220px; left: 0; right: 0; height: 20px; background-color: #000000;"></div> <div style="position: absolute; top: 240px; left: 0; right: 0; height: 20px; background-color: #000000;"></div> <div style="position: absolute; top: 260px; left: 0; right: 0; height: 20px; background-color: #000000;"></div> <div style="position: absolute; top: 280px; left: 0; right: 0; height: 20px; background-color: #000000;"></div> <div style="position: absolute; top: 300px; left: 0; right: 0; height: 20px; background-color: #000000;"></div> <div style="position: absolute; top: 320px; left: 0; right: 0; height: 20px; background-color: #000000;"></div> <div style="position: absolute; top: 340px; left: 0; right: 0; height: 20px; background-color: #000000;"></div> <div style="position: absolute; top: 360px; left: 0; right: 0; height: 20px; background-color: #000000;"></div> <div style="position: absolute; top: 380px; left: 0; right: 0; height: 20px; background-color: #000000;"></div> <div style="position: absolute; top: 400px; left: 0; right: 0; height: 20px; background-color: #000000;"></div> </div> <div style="flex: 2; padding-left: 10px;"> <div style="margin-bottom: 10px;"> Elevation of reference point: <u>[728.89-ft]</u> (top of casing) Height of reference point above <u>[2.1-ft]</u> ground surface </div> <div style="margin-bottom: 10px;"> Depth of surface seal <u>[ND]</u> Type of surface seal: <u>None documented</u> </div> <div style="margin-bottom: 10px;"> I.D. of surface casing <u>[ND]</u> (None documented) </div> <div style="margin-bottom: 10px;"> I.D. of riser pipe: <u>[8-in]</u> Type of riser pipe: <u>Carbon steel</u> </div> <div style="margin-bottom: 10px;"> Diameter of borehole: <u>[9-in nom]</u> </div> <div style="margin-bottom: 10px;"> Type of filler: <u>Not documented</u> </div> <div style="margin-bottom: 10px;"> Elevation/depth top of seal Type of seal: <u>Not documented</u> </div> <div style="margin-bottom: 10px;"> Depth top of perforations: <u>[256-ft]</u> Description of perforations: <u>Not documented</u> </div> <div style="margin-bottom: 10px;"> Depth bottom of perforations: <u>[304-ft]</u> </div> <div style="margin-bottom: 10px;"> Depth bottom of casing: <u>[305.0-ft]</u> </div> <div style="margin-bottom: 10px;"> Depth bottom of borehole <u>[307-ft]</u> </div> </div> </div>		
Drawing By: <u>RKL/2W11-10.ASB</u> Date: <u>19Jun92</u>			
Reference: <u>HANFORD WELLS</u>			

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS RESOURCE PROTECTION WELL - 299-W11-10

WELL DESIGNATION : 299-W11-10
 CERCLA UNIT : 200 Aggregate Area Management Study
 RCRA FACILITY : Not applicable
 HANFORD COORDINATES : N 43,150 W 71,500
 LAMBERT COORDINATES : N 448,268 E 2,223,714
 DATE DRILLED : Apr56
 DEPTH DRILLED (GS) : 307-ft
 MEASURED DEPTH (GS) : Not documented
 DEPTH TO WATER (GS) : 279-ft, Apr56;
 270.6-ft, Dec91
 CASING DIAMETER : 8-in carbon steel, +2.1~305.0-ft;
 ELEV TOP CASING : 728.89-ft
 ELEV GROUND SURFACE : 726.8-ft, Estimated
 PERFORATED INTERVAL : 8-in casing, 256~304-ft
 SCREENED INTERVAL : Not applicable
 COMMENTS : FIELD INSPECTION, 21May91,
 8-in carbon steel casing.
 No pad, No posts, capped and locked.
 No permanent identification.
 Not in radiation zone.
 OTHER:
 AVAILABLE LOGS : Driller
 TV SCAN COMMENTS : Not applicable
 DATE EVALUATED : Not applicable
 EVAL RECOMMENDATION : Not applicable
 LISTED USE : Separations area Semiannual water level measurement, 18Apr56-01Dec91
 Not on water sample schedule
 PUMP TYPE : None documented
 MAINTENANCE :

WELL CONSTRUCTION AND COMPLETION SUMMARY			
Drilling Method: <u>Cable tool</u> Fluid Used: <u>Water</u> Driller's Name: <u>Chausse</u> Company: <u>Not documented</u> Date Started: <u>17Apr56</u>	Sample Method: <u>Hard tool nom</u> Additives Used: <u>Not documented</u> WA State Lic Nr: <u>Not documented</u> Company Location: <u>Not documented</u> Date Complete: <u>09May56</u>	WELL NUMBER: <u>299-W12-1</u> Hanford Coordinates: N/S <u>N 45,083</u> E/W <u>W 70,733</u> State Coordinates: N <u>450,203</u> E <u>2,224,476</u> Start Card #: <u>Not documented</u> T <u> </u> R <u> </u> S <u> </u> Elevation Ground surface (ft): <u>724.2 Estimated</u>	
Depth to water: <u>288-ft May56</u> (Ground surface) <u>273.1-ft Dec91</u>			
GENERALIZED STRATIGRAPHY Driller's Log 0-10: TOPSOIL-GRAVEL 10-21: SAND-COBBLER 21-72: Not documented 72-110: Pea GRAVEL-SAND-SILT 110-127: Not documented 127-136: GRAVEL, SAND, SILT 144,148: SAND 148-175: Not documented 175-178: SAND-GRAVEL 179,187: BOULDERS, SAND and GRAVEL 187-200: Not documented 200-230: Cemented GRAVEL 230-297: Not documented 297-314 SAND, SILT and GRAVEL		 <div style="position: absolute; left: 510px; top: 255px; width: 350px;"> Elevation of reference point: <u>[726.46-ft]</u> (top of casing) Height of reference point above <u>[2.26-ft]</u> ground surface Depth of surface seal <u>[ND]</u> Type of surface seal: <u>None documented</u> I.D. of surface casing <u>[10-in nom]</u> (Assumed pulled) I.D. of riser pipe: <u>[8-in]</u> Type of riser pipe: <u>Carbon steel</u> Diameter of borehole: <u>[9-in nom]</u> Type of filler: <u>Not documented</u> Elevation/depth top of seal Type of seal: <u>Not documented</u> Depth top of perforations: <u>[274-ft]</u> Description of perforations: <u>Not documented</u> Depth bottom of perforations: <u>[309-ft]</u> Depth bottom of casing: <u>[310-ft]</u> Depth bottom of borehole: <u>[314-ft]</u> </div>	
Drawing By: <u>RKL/2W12-01.ASB</u> Date: <u>19Jun92</u>		Reference: <u>HANFORD WELLS</u>	

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SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-W12-1

WELL DESIGNATION : 299-W12-1
 CERCLA UNIT : 200 Aggregate Area Management Study
 RCRA FACILITY : Not applicable
 HANFORD COORDINATES : N 45,083 W 70,733
 LAMBERT COORDINATES : N 450,203 E 2,224,476
 DATE DRILLED : May56
 DEPTH DRILLED (GS) : 314-ft
 MEASURED DEPTH (GS) : Not documented
 DEPTH TO WATER (GS) : 288-ft, May56
 : 273.1-ft, 01Dec91
 CASING DIAMETER : 8-in carbon steel, +2.3"-310-ft;
 ELEV TOP CASING : 726.46-ft
 ELEV GROUND SURFACE : 724.2-ft Estimated
 PERFORATED INTERVAL : 8-in casing, 274-309-ft
 SCREENED INTERVAL : Not applicable
 COMMENTS : FIELD INSPECTION, 22Apr91,
 : 8-in carbon steel casing.
 : No pad, No posts, capped, not locked.
 : No permanent identification.
 : Not in radiation zone.
 : OTHER:
 AVAILABLE LOGS : Driller
 TV SCAN COMMENTS : Not applicable
 DATE EVALUATED : Not applicable
 EVAL RECOMMENDATION : Not applicable
 LISTED USE : Separations area water level measurement, 21May56-01Dec91
 : PNL Annual water sample schedule
 PUMP TYPE : None documented
 MAINTENANCE :

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WELL CONSTRUCTION AND COMPLETION SUMMARY			
Drilling Method: <u>Cable tool</u> Fluid Used: <u>Not documented</u> Driller's Name: <u>Gentz</u> Company: <u>Not documented</u> Date Started: <u>02Nov53</u>	Sample Method: <u>Hard tool (nom)</u> Additives Used: <u>Not documented</u> Lic Nr: <u>Not documented</u> Company Location: <u>Not documented</u> Date Complete: <u>01Dec53</u>	WELL NUMBER: <u>299-W11-8</u> Hanford State Coordinates: N/S <u>N 42,759</u> E/W <u>W 72,992</u> State Coordinates: N <u>447,873</u> E <u>2,222,223</u> Start Card #: <u>Not documented</u> T <u> </u> R <u> </u> S <u> </u> Elevation Ground surface (ft): <u>Not documented</u>	
Depth to water: <u>289-ft Nov53</u> (Ground surface) <u>260-ft Jan65</u> GENERALIZED Driller's STRATIGRAPHY Log		Elevation of reference point: <u>(719.18-ft)</u> (top of casing) Height of reference point above <u>[ND]</u> ground surface Depth of surface seal <u>[ND]</u> Type of surface seal: <u>None documented</u> I.D. of surface casing <u>[ND]</u> (If present) I.D. of riser pipe: <u>[8-in]</u> Type of riser pipe: <u>Carbon steel</u> Diameter of borehole: <u>[9-in nom]</u> Type of filler: <u>Not documented</u> Depth top of perforations: <u>[260-ft]</u> Description of perforations: <u>260-270-ft, 6 holes/ft</u> <u>270-310-ft, not documented</u> Depth bottom of perforations: <u>[310-ft]</u> Depth bottom of casing: <u>[313.8-ft]</u> Depth bottom of borehole: <u>[315-ft]</u>	
0-12: Fine SAND 12-22: Coarse GRAVEL 22-34: Coarse GRAVEL and BOULDERS <8-in 34-42: 80% coarse-small GRAVEL, 20% fine gray SAND 42-50: Fine gray SAND, little SILT 50-65: 50% fine gray-50% coarse SAND 65-70: Fine & coarse SAND, little SILT 70-75: SAND and SILT 75-100: Fine brown SAND, little SILT 100-145: SAND and SILT 145-154: SAND, SILT and CALICHE 154-160: 75% coarse gray SAND, 50% small-coarse GRAVEL <2-in 160-173: 25% fine SAND, 75% small & coarse GRAVEL <3-in 173-178: Fine SAND 178-195: 90% coarse GRAVEL, 10% fine SAND 195-210: Coarse GRAVEL up to 5-in 210-215: 25% pea, 75% coarse GRAVEL 215-225: Coarse GRAVEL and COBBLES 225-232: 40% coarse SAND, 40% pea, 20% coarse GRAVEL 232-265: Small GRAVEL, SAND and SILT 265-285: 50% small and coarse GRAVEL 50% fine SAND and SILT 285-300: Coarse GRAVEL, BOULDERS, SAND and SILT 300-310: Small and coarse GRAVEL and fine SAND 310-315: Coarse GRAVEL, BOULDERS and fine SAND REMEDIATION: Aug 56, by Wall-Richards Perforated 260-270-ft			
Drawing By: <u>RKL/2W11-08.ASB</u> Date: <u>19Jun92</u> Reference: <u>HANFORD WELLS</u>			

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-W11-8

WELL DESIGNATION : 299-W11-8
 CERCLA UNIT : 200 Aggregate Area Management Study
 RCRA FACILITY :
 HANFORD COORDINATES : N 42,759 W 72,992
 LAMBERT COORDINATES : N 447,873 E 2,222,223
 DATE DRILLED : Dec53
 DEPTH DRILLED (GS) : 315-ft
 MEASURED DEPTH (GS) : Not documented
 DEPTH TO WATER (GS) : 289-ft, Sep56;
 ~260-ft, Jan65
 CASING DIAMETER : 8-in carbon steel, +ND~314-ft;
 ELEV TOP CASING : 719.18-ft
 ELEV GROUND SURFACE : Not documented
 PERFORATED INTERVAL : 8-in casing, 260-310-ft
 SCREENED INTERVAL : Not applicable
 COMMENTS : FIELD INSPECTION,
 OTHER:
 AVAILABLE LOGS : Driller
 TV SCAN COMMENTS : Not applicable
 DATE EVALUATED : Not applicable
 EVAL RECOMMENDATION : Not applicable
 LISTED USE : Water levels measured, 21Jan54-19Jan65;
 Not on water sample schedule
 PUMP TYPE : None documented
 MAINTENANCE :

9312968.0357

WELL CONSTRUCTION AND COMPLETION SUMMARY			
Drilling Method: <u>Cable tool</u> Drilling Fluid Used: <u>Not documented</u> Driller's Name: <u>Gentz</u> Drilling Company: <u>Not documented</u> Date Started: <u>05Feb54</u>	Sample Method: <u>Hard tool (nom)</u> Additives Used: <u>Bentonite</u> WA State Lic Nr: <u>Not documented</u> Company Location: <u>Not documented</u> Date Complete: <u>26Apr54</u>	WELL NUMBER: <u>299-W11-9</u> Hanford Coordinates: N/S <u>N 43,319</u> E/W <u>W 72,542</u> State Coordinates: N <u>448,435</u> E <u>2,222,672</u> Start Card #: <u>Not documented</u> T <u> </u> R <u> </u> S <u> </u> Elevation Ground surface (ft): <u>721.0 Estimated</u>	
Depth to water: <u>285-ft Apr54</u> (Ground surface) <u>262.8-ft Dec91</u> GENERALIZED Driller's STRATIGRAPHY Log		<div style="display: flex; align-items: center;"> <div style="flex: 1;"> </div> <div style="flex: 1; padding-left: 10px;"> Elevation of reference point: <u>[722.94-ft]</u> (top of casing) Height of reference point above <u>[2.0-ft]</u> ground surface Depth of surface seal <u>[ND]</u> Type of surface seal: <u>None documented</u> I.D. of surface casing <u>[ND]</u> (If present) I.D. of riser pipe: <u>[8-in]</u> Type of riser pipe: <u>Carbon steel</u> Diameter of borehole: <u>[9-in nom]</u> Type of filler: <u>Not documented</u> 8-in casing to 270-ft 6-in liner 253.5-297-ft Top of liner flared to 8-in casing Perforated 275-297-ft, 4 holes/ft Depth bottom of borehole: <u>[297-ft]</u> </div> </div>	
<div style="display: flex;"> <div style="flex: 1; padding-right: 10px;"> 0-10: COBBLES, coarse GRAVEL and SILT 10-25: BOULDERS, GRAVEL and SAND 25-30: Coarse GRAVEL and SAND 30-35: BOULDERS, GRAVEL, little SAND 35-40: BASALT, COBBLES, little SAND 40-48: COBBLES, GRAVEL, SAND 48-62: Coarse SAND and SILT 62-85: Small and coarse GRAVEL, SAND and SILT 85-90: Coarse and fine SAND 90-100: SAND, little SILT 100-110: Coarse and fine SAND 110-115: SAND, little SILT 115-135: SAND, SILT, CLAY 135-140: SAND, SILT, CALICHE 140-146: SAND, little SILT 146-160: Small and coarse GRAVEL & SAND 160-165: COBBLES, GRAVEL and SAND 165-180: Coarse SAND and GRAVEL 180-185: COBBLES and coarse GRAVEL 185-210: Coarse GRAVEL and SAND 210-220: COBBLES, coarse GRAVEL & SAND 220-235: Coarse GRAVEL, SAND, little SILT 235-245: Coarse GRAVEL, fine SAND 245-250: Coarse GRAVEL, SAND & SILT 250-255: Coarse GRAVEL and SAND 255-262: Coarse GRAVEL, SAND & SILT 262-270: RIND STONE, coarse GRAVEL, SAND, little SILT 270-275: Small and coarse GRAVEL, SAND, little SILT 275-280: GRAVEL, SAND and SILT 280-285: SAND, SILT, little GRAVEL 285-290: Coarse GRAVEL, SAND, little SILT 290-292: SAND, SILT and coarse GRAVEL 292-297: Small and coarse GRAVEL to 4-in (Drilling with bentonite @ 293-ft) </div> <div style="flex: 1; border-left: 1px solid black; padding-left: 10px;"> Drawing By: <u>RKL/2W11-09.ASB</u> Date: <u>19Jun92</u> Reference: <u>HANFORD WELLS</u> </div> </div>			

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-W11-9

WELL DESIGNATION : 299-W11-9
 CERCLA UNIT : 200 Aggregate Area Management Study
 RCRA FACILITY :
 HANFORD COORDINATES : N 43,319 W 72,542
 LAMBERT COORDINATES : N 448,435 E 2,222,672
 DATE DRILLED : Apr54
 DEPTH DRILLED (GS) : 297-ft
 MEASURED DEPTH (GS) : Not documented
 DEPTH TO WATER (GS) : 285-ft, Apr54;
 262.8-ft, 01Dec91
 CASING DIAMETER : 8-in carbon steel, +2.0-270-ft;
 6-in carbon steel liner, 253.5-297-ft
 ELEV TOP CASING : 722.94-ft
 ELEV GROUND SURFACE : Not documented
 PERFORATED INTERVAL : 6-in liner, 275-297-ft
 SCREENED INTERVAL : Not applicable
 COMMENTS : FIELD INSPECTION, 21May91,
 8-in carbon steel casing.
 No pad, No posts, capped and locked.
 No permanent identification.
 Not in radiation zone.
 OTHER:
 AVAILABLE LOGS : Driller
 TV SCAN COMMENTS : Not applicable
 DATE EVALUATED : Not applicable
 EVAL RECOMMENDATION : Not applicable
 LISTED USE : Separations area Semiannual water level measurement, 17Jun54-01Dec91;
 PNL Annual water sample schedule
 PUMP TYPE : None documented
 MAINTENANCE :

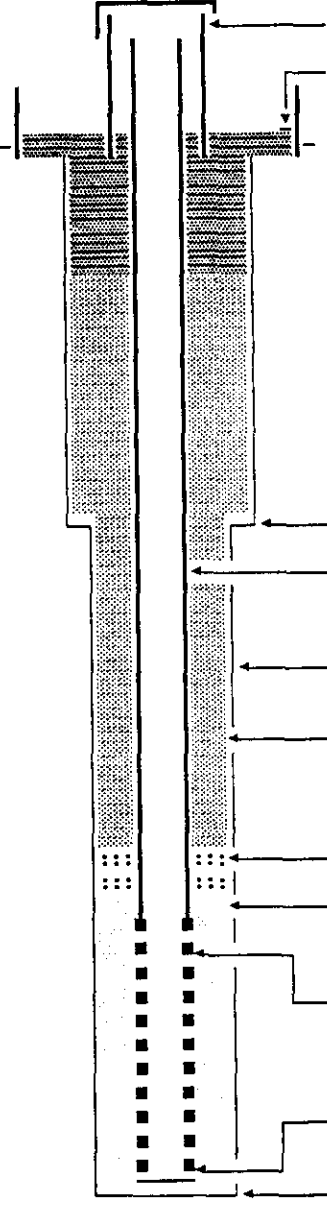
9312968.0369

WELL CONSTRUCTION AND COMPLETION SUMMARY			
Drilling Method: <u>Cable tool</u> Fluid Used: <u>Water</u> Driller's Name: <u>L. Watkins</u> Company: <u>Kaiser Engineers Han</u> Date Started: <u>01Mar90</u>	Sample Drive barrel Method: <u>Hard tool</u> Additives Used: <u>None</u> WA State Lic Nr: <u>Not documented</u> Company Location: <u>Richland, WA</u> Date Complete: <u>15May90</u>	WELL NUMBER: <u>299-W22-40</u> TEMPORARY WELL NO: _____ Hanford Coordinates: N/S <u>N 36,242.3</u> E/W <u>W 73,041.7</u> State NAD83 Coordinates: N <u>134,509.99m</u> E <u>567,634.57m</u> Start Card #: <u>Not documented</u> T _____ R _____ S _____ Elevation Ground surface (ft): <u>689.22 Brass cap</u>	
Depth to water: <u>228.1-ft Apr90</u> (Ground surface) <u>231.8-ft Mar92</u>			
GENERALIZED Geologist's STRATIGRAPHY Log		Elevation of reference point: <u>[692.23-ft]</u> (top of casing) Height of reference point above <u>[3.0-ft]</u> ground surface	
5: SAND 10: Slightly gravelly, slightly muddy SAND 15: Slightly muddy SAND 20: Muddy SAND 25,30: Slightly gravelly SAND 35,40: SAND 43: Muddy SAND 45,50,55: SAND 60: Slightly gravelly SAND 64: Slightly muddy SAND 65: Gravelly SAND 70,75,80,85: SAND 87: Slightly muddy SAND 90,95: SAND (Sl muddy 92-93, 94-94.5) 100: Muddy SAND 105: SAND 110,115: Slightly muddy SAND 120-155: SAND 160,165,170: Slightly muddy SAND 175: Muddy SAND 180: Slightly muddy SAND 185: Muddy SAND 190: Slightly gravelly, slightly muddy SAND 195: Slightly muddy gravelly SAND 200: Slightly muddy SAND 205: Slightly gravelly, slightly muddy SAND 210,215,220: Muddy SAND 225: Slightly muddy SAND 230: Muddy SAND 235,240,245: Muddy sandy GRAVEL		Depth of surface seal <u>[20.5-ft]</u> Type of surface seal: <u>Cement grout</u>	
10 3/4-in nominal hole to 143.5-ft.		I.D. of riser pipe: <u>[4-in]</u> Type of riser pipe: <u>Type 304 stainless steel</u>	
Diameter of borehole: <u>[9-in nom]</u> 143.5-245.0-ft		Type of filler, 20.5-211.1-ft: <u>Bentonite crumbles</u> <u>8-20 mesh</u>	
Bentonite pellets, 1/2-3/8-in 211.1-218.1-ft		Depth top of sand pack: <u>[218.1-ft]</u> 40 mesh silica sand to 243.2-ft	
Depth top of screen: <u>[224.1-ft]</u> 4-in, #10-slot, Johnson type 304 <u>stainless steel, wire wrapped,</u> <u>with bottom cap and channel pack</u>		Depth bottom of screen: <u>[244.5-ft]</u>	
Depth bottom of borehole: <u>[245.0-ft]</u>		Drawing By: <u>RKL/2W22-40.ASB</u> Date: <u>19Jun92</u>	
Reference: <u>WHC-MR-0208, October 1990</u> <u>KEH Survey Data Report, 18Jun90</u>			

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-W22-40

WELL DESIGNATION : 299-W22-40
 CERCLA UNIT : 200 Aggregate Area Management Study
 RCRA FACILITY : 216-U-12
 HANFORD COORDINATES : N 36,242.3 W 73,041.7
 LAMBERT COORDINATES : NAD83 N 134,509.99m E 567,634.57m
 DATE DRILLED : May90
 DEPTH DRILLED (GS) : 245.0-ft
 MEASURED DEPTH (GS) : 244.5-ft
 DEPTH TO WATER (GS) : 228.1-ft, Apr90;
 231.8-ft, Mar92
 CASING DIAMETER : 4-in, stainless steel, +ND~224.1-ft;
 6-in, stainless steel, +3.0~0.5-ft (not documented)
 ELEV TOP CASING : 692.33-ft
 ELEV GROUND SURFACE : 689.22 (Brass cap)
 PERFORATED INTERVAL : Not applicable
 SCREENED INTERVAL : 224.1~244.5-ft, #10-slot, stainless steel
 COMMENTS : FIELD INSPECTION,
 OTHER:
 AVAILABLE LOGS : Driller
 TV SCAN COMMENTS : Not applicable
 DATE EVALUATED : Not applicable
 EVAL RECOMMENDATION : Not applicable
 LISTED USE : U-12 crib Quarterly water level measurement, 20Nov90~11Mar92;
 Not on water sample schedule
 PUMP TYPE : Hydrostar
 MAINTENANCE :

930706716

WELL CONSTRUCTION AND COMPLETION SUMMARY			
Drilling Method: <u>Cable tool</u> Fluid Used: <u>Water</u> Driller's Name: <u>C. Wamsley</u> Company: <u>Kaiser Engineers Han</u> Date Started: <u>07Feb90</u>	Sample Drive barrel Method: <u>Hard tool</u> Additives Used: <u>None</u> WA State Lic Nr: <u>Not documented</u> Location: <u>Richland, WA</u> Date Complete: <u>15May90</u>	WELL NUMBER: <u>299-W22-41</u> Hanford Coordinates: N/S <u>N 36,142.1</u> E/W <u>W 73,033.8</u> State NAD83 Coordinates: N <u>134,479.46m</u> E <u>567,637.04m</u> Start Card #: <u>Not documented</u> T <u> </u> R <u> </u> S <u> </u> Elevation Ground surface (ft): <u>688.77 Brass cap</u>	TEMPORARY WELL NO: <u> </u>
Depth to water: <u>228.0-ft Apr90</u> (Ground surface) <u>231.2-ft Dec91</u>		Elevation of reference point: <u>[691.74-ft]</u> (top of casing) Height of reference point above <u>[3.0 ft]</u> ground surface	
GENERALIZED STRATIGRAPHY Geologist's Log		Depth of surface seal <u>[18.4-ft]</u> Type of surface seal: <u>Cement grout</u>	
5: Slightly muddy SAND 10-45: SAND 50: Slightly gravelly SAND 55-105: SAND (slightly cemented at 104 ft) 110: Muddy SAND 115-155: SAND 160: Muddy SAND 165-185: Sandy MUD 190-205: Muddy sandy GRAVEL 210-230: Sandy MUD 235-245: Muddy sandy GRAVEL			
		10 3/4-in nominal hole to 132.1-ft I.D. of riser pipe: <u>[4-in]</u> Type of riser pipe: <u>Type 304 stainless steel</u>	
		Diameter of borehole: <u>[9-in nom]</u> 132.1-244.4-ft Type of filler, 18.4-215.4-ft: <u>Bentonite crumbles 8-20 mesh</u>	
		Bentonite pellets, 1/2-3/8-in 215.4-220.7-ft Depth top of sand pack: <u>[220.7-ft]</u> 40-100 mesh silica sand to 243.7-ft	
		Depth top of screen: <u>[224.1-ft]</u> <u>4-in, #5-slot, Johnson type 304 stainless steel, wire wrapped, with bottom cap.</u>	
		Depth bottom of screen: <u>[245.3-ft]</u>	
		Depth bottom of borehole: <u>[245.3-ft]</u>	
Drawing By: <u>RKL/2W22-41.ASB</u> Date: <u>19Jun92</u>			
Reference: <u>WHC-MR-0208, October 1990</u> <u>KEH Survey Data Report, 18Jun90</u>			

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SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-W22-41

WELL DESIGNATION : 299-W22-41
 CERCLA UNIT : 200 Aggregate Area Management Study
 RCRA FACILITY : 216-U-12
 HANFORD COORDINATES : N 36,142.1 W 73,033.8
 LAMBERT COORDINATES : NAD83 N 134,479.46m E 567,637.04m
 DATE DRILLED : May90
 DEPTH DRILLED (GS) : 245.3-ft
 MEASURED DEPTH (GS) : 245.3-ft
 DEPTH TO WATER (GS) : 228.0-ft, Apr90;
 231.3-ft, Mar91
 CASING DIAMETER : 4-in, stainless steel, +ND=224.1-ft;
 6-in, stainless steel, +3.0~-0.5-ft (not documented)
 ELEV TOP CASING : 691.74-ft
 ELEV GROUND SURFACE : 688.77 (Brass cap)
 PERFORATED INTERVAL : Not applicable
 SCREENED INTERVAL : 224.1~245.3-ft, #5-slot, stainless steel
 COMMENTS : FIELD INSPECTION;
 OTHER:
 AVAILABLE LOGS : Driller
 TV SCAN COMMENTS : Not applicable
 DATE EVALUATED : Not applicable
 EVAL RECOMMENDATION : Not applicable
 LISTED USE : U-12 Crib Quarterly water level measurement, 20Nov90~11Mar91;
 Not on water sample schedule
 PUMP TYPE : Hydrostar
 MAINTENANCE :

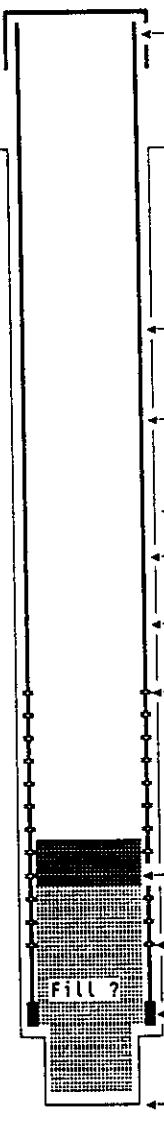
9907-096716

WELL CONSTRUCTION AND COMPLETION SUMMARY			
Drilling Method: <u>Cable tool</u> Fluid Used: <u>Water</u> Driller's: _____ Name: <u>G. Lydin</u> Company: <u>Kaiser Engineers Han</u> Date: _____ Started: <u>12Feb90</u>	Sample Drive barrel Method: <u>Hard tool</u> Additives: _____ Used: <u>None</u> WA State: _____ Lic Nr: <u>Not documented</u> Company: _____ Location: <u>Richland, WA</u> Date: _____ Complete: <u>15May90</u>	WELL NUMBER: <u>299-W22-42</u> Hanford Coordinates: N/S <u>N 36,052.7</u> E/W <u>W 73,079.6</u> State <u>NAD83</u> Coordinates: N <u>134,452.20m</u> E <u>567,623.16m</u> Start Card #: <u>Not documented</u> T _____ R _____ S _____ Elevation Ground surface (ft): <u>688.20 Brass cap</u>	
Depth to water: <u>227.0-ft Apr90</u> (Ground surface) <u>230.6-ft Dec91</u>			
GENERALIZED STRATIGRAPHY Geologist's Log		Elevation of reference point: <u>[691.16-ft]</u> (top of casing) Height of reference point above <u>[3.0-ft]</u> ground surface	
5-30: SAND 35: Slightly muddy SAND 40,45: SAND 50: Gravelly SAND 55-150: SAND 155: Slightly muddy SAND 160: Muddy SAND 165,170: Sandy MUD 175-185: Muddy SAND 190,195: Gravelly muddy SAND 200,205: Muddy SAND 210,215: Slightly gravelly sandy MUD 220,225: Sandy MUD 230: Muddy SAND 235-245: Muddy sandy GRAVEL		Depth of surface seal <u>[18.8-ft]</u> Type of surface seal: <u>Cement grout</u>	
		10 3/4-in nominal hole to 137.7-ft.	
		I.D. of riser pipe: <u>[4-in]</u> Type of riser pipe: <u>Type 304 stainless steel</u>	
		Diameter of borehole: <u>[9-in nom]</u> 137.7-243.4-ft	
		Type of filler, 18.8-215.2-ft: <u>Bentonite crumbles</u> <u>8-20 mesh</u>	
		Bentonite pellets, 1/2-3/8-in 215.2-219.7-ft	
		Depth top of sand pack: <u>[219.7-ft]</u> 40-mesh silica sand to 243.2-ft	
		Depth top of screen: <u>[223.1-ft]</u> 4-in, #10-slot, Johnson type 304 <u>stainless steel, wire wrapped,</u> <u>with bottom cap.</u>	
		Depth bottom of screen: <u>[243.4-ft]</u>	
Depth bottom of borehole: <u>[243.4-ft]</u>			
Drawing By: <u>RKL/2W22-42.ASB</u> Date: <u>19Jun92</u>			
Reference: <u>WHC-MR-0208, October 1990</u> <u>KEH Survey Data Report 18Jun90</u>			

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WELL DESIGNATION      : 299-W22-42
CERCLA UNIT           : 200 Aggregate Area Management Study
RCRA FACILITY         : 216-U-12
HANFORD COORDINATES  : N 36,052.7 W 73,079.6
LAMBERT COORDINATES  : NAD83 N 134,452.20m E 567,623.16m
DATE DRILLED          : May90
DEPTH DRILLED (GS)   : 243.4-ft
MEASURED DEPTH (GS)  : 243.4-ft
DEPTH TO WATER (GS)  : 227.0-ft, Apr90;
                       230.6-ft, Dec91
CASING DIAMETER       : 4-in, stainless steel, ~+1.0~223.1-ft;
                       6-in stainless steel, +3.0~0.5-ft (not documented)
ELEV TOP CASING       : 691.16-ft
ELEV GROUND SURFACE   : 688.20 (Brass cap)
PERFORATED INTERVAL   : Not applicable
SCREENED INTERVAL     : 223.1~243.4-ft, 10-slot, stainless steel
COMMENTS              : FIELD INSPECTION:
                       OTHER:
AVAILABLE LOGS        : Driller
TV SCAN COMMENTS      : Not applicable
DATE EVALUATED        : Not applicable
EVAL RECOMMENDATION   : Not applicable
LISTED USE            : Water levels measured, 20Nov90~10Dec91;
                       Not on water sample schedule
PUMP TYPE             : Hydrostar
MAINTENANCE           :

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WELL CONSTRUCTION AND COMPLETION SUMMARY			
Drilling Method: <u>Cable tool</u> Fluid Used: <u>Water</u> Driller's Name: <u>Swain</u> Company: <u>Not documented</u> Date Started: <u>17May57</u>	Sample Method: <u>Hard tool (nom)</u> Additives Used: <u>Bentonite</u> WA State Lic Nr: <u>Not documented</u> Company Location: <u>ND</u> Date Complete: <u>14Jun57</u>	WELL NUMBER: <u>699-38-70</u> Hanford Coordinates: N/S <u>N 38,142</u> E/W <u>W 70,226</u> State Coordinates: N <u>443,264</u> E <u>2,225,001</u> Start Card #: <u>Not documented</u> T <u> </u> R <u> </u> S <u> </u> Elevation Ground surface (ft): <u>Not documented</u>	
Depth to water: <u>270-ft Jun87</u> GENERALIZED STRATIGRAPHY Driller's Log		Elevation of reference point: <u>[710.67-ft]</u> (top of casing) Height of reference point above ground surface: <u>[ND]</u> Depth of surface seal: <u>[ND]</u> Type of surface seal: <u>None documented</u> I.D. of surface casing (If present): <u>[ND]</u> DRILLER'S NOTE: Casing may be parted at joint 50 ft from top I.D. of riser pipe: <u>[8-in]</u> Type of riser pipe: <u>Carbon steel</u> Diameter of borehole: <u>[9-in nom]</u> Type of filler: <u>Not documented</u> Elevation/depth top of seal: <u>Not documented</u> Type of seal: <u>Not documented</u> Depth top of perforations: <u>[255-ft]</u> <u>255-320-ft, 3 cuts/ft</u> <u>320-380-ft, 2 cuts/2 ft</u> Cement plug, ~ 300-310-ft Depth bottom of perforations: <u>[380-ft]</u> Depth bottom of casing: <u>[388-ft]</u> Depth bottom of borehole: <u>[413-ft]</u>	
0-5: SAND 5-15: Small GRAVEL 15-25: Sandy SILT-GRAVEL 25-30: SILT, coarse SAND 30-45: Sandy SILT 45-55: SAND-SILT-GRAVEL 55-70: SAND-SILT 70-72: SAND-small GRAVEL 72-80: SAND-coarse and clean 80-120: SAND-SILT 120-130: SAND-SILT (harder packed) 130-190: SAND-SILT 190-200: SAND-SILT-small GRAVEL (water) 200-205: SAND-SILT-small GRAVEL 205-220: SAND-SILT 220-230: SAND-SILT, soft, more CLAY than SAND 230-245: Small GRAVEL-CLAY 245-250: CLAY 250-260: CLAY-GRAVEL 260-265: SAND-SILT-GRAVEL 265-310: SAND-GRAVEL, mostly clean 310-315: SAND-GRAVEL, a little SILT 315-320: SAND-SILT-GRAVEL-CLAY 320-335: SAND, SILT and GRAVEL 335-345: SAND-GRAVEL 345-350: Clean coarse SAND 350-360: Fine clean SAND 360-365: SAND 365-369: SAND-small GRAVEL 369-375: SAND-hardpacked 375-380: SAND-softer, very fine 380-390: SAND-SILT, very fine 390-395: SAND-GRAVEL 395-400: SAND 400-413: Fine SAND and SILT (caving) REMEDIATIONS: Jun 64, Crowe Installed plastic piezometer tubes Jul75, M. Bultena, cleaned well Jul77, Bigham, set cement plug			
Drawing By: <u>RKL/6N38W70.ASB</u> Date: <u>29Jun92</u> Reference: <u>HANFORD WELLS</u>			

WELL NAME	699-37-82A	COMPLETION DATE	10/10/60
CASING ELEV.	636.75 Feet	INITIAL	
WELL DEPTH	175.00 Feet	DEPTH TO WATER	163.0 ft
DRILL DEPTH	440.00 Feet		
COORDINATES	N-S 37018 P		
	E-W -81988 P		
			PAGE 1 of 1

